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Description of several new genera and species of Fossil Fishes, from the Carboniferous Strata of Ohio.

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MECOLEPIS Newberry.

Heterocercal lepidoids of small size. Body fusiform. Head obtuse. Tail elongated. Lobes very unequal. Fins small and provided with delicate fulcra. Dorsal opposite anal or nearly so, both set far back in body. Cranial surface ornamented by corrugations, tubercles or granulations. Opercular, maxillary and hyoid plates ornamented with convoluted corrugations of the surface in various patterns.

Scales smooth, or ornamented; posterior margin of lateral scales all or in part serrated. Scales of median line above and below characteristically angled or crenulated. Two rows of scales on sides extending back to near anal fin, remarkably high, vertical 2 to 5 times longitudinal diameter.

Lateral line nearly straight, passing the upper part of lower row of high scales.

Teeth conical, short, *en brosse*.

The peculiar group of fishes to which I have given the generic name of *Mecolepis*, apparently represents the *Palæonisci* in the ichthyic fauna of the locality where they occur. From *Amblypterus* and *Elonichthys* they may readily be distinguished by their small fins all bearing fulcra. With *Palæoniscus* their affinities are closer, but the *ensemble* of characters presented by the large number of specimens which I have examined, seem to separate them from that genus. Among these diagnostic characters the most conspicuous are their small size, posterior position of dorsal fin and especially the high lateral scales.

1. *M. CORRUGATUS* Newb. Body fusiform, robust. Length 3 in. 4 lines; breadth 10 lines. Length of head 8 lines. Anterior lateral scales $2\frac{1}{2}$ times as high as long. Cranial plates ornamented by convolutions of fine, thread-like corrugations. Maxillary bones, opercular and hyoid plates corrugated much as superior surface of head. Scales smooth, except a few on the anterior dorsal surface, which are finely striate and punctate. Posterior margins of lateral scales as far back as anal and dorsal fins serrated. Scales of tail, like most of those of the dorsal and ventral surfaces, plain on surface and margins. Anterior margin of anal fin opposite centre of dorsal fin; longest rays of anal fin when collapsed just reaching base of caudal fin.

2. *M. TUBERCULATUS* Newb. Body fusiform. Entire length 3 inches. Head 6 lines. Tail 8 lines.

Cranial plates strongly tuberculated; tubercles rounded elongated and reniform. Surfaces of opercular, maxillary and hyoid bones covered with linear parallel corrugations.

Surface of all the scales of the body smooth, except a few on the anterior

dorsal and ventral surfaces, which are sometimes finely punctate. Lateral scales nearly 5 times as high as long. Posterior margins of lateral scales bearing a few serrations.

Anal fin opposite dorsal.

Radial formula,

D. 5; C. 14; A. 8?; V. 6; P. ?

3. *M. GRANULATUS* Newb. Body fusiform, robust. Length 3 inches, breadth 7 lines. Head 6 lines long. Tail 9 lines.

Head tubercled above, tubercles elongated, with granulations between. Opercula, maxillaries and hyoid plates threaded.

Scales apparently thinner and more delicate than those of any other species. Those on anterior portion of body granulated, and having a faint double waved line along anterior margin. Posterior border serrated.

Lateral scales 4 times as high as long.

Radial formula,

D. 6; C. 14; A. 8; V. 5?; P. 9?

4. *M. LINEATUS* Newb. Body fusiform, robust. Length 3 inches; breadth 8 lines.

Cephalic bones all ornamented with thread-like lines, as in *M. corrugatus*, and without tubercles.

Scales of anterior portion of abdomen covered with concentric thread-lines. Margins of lateral scales ornamented in the same manner.

Lateral scales lower than in any other species yet discovered, greatest vertical diameter only twice longitudinal.

Scales of abdomen twice as long as broad.

5. *M. OVIDEUS* Newb. Fish small, robust. Body ovoid. Length 1 inch 6 lines; breadth 6 lines. Length of head $4\frac{1}{2}$ lines.

Cranial surface corrugated and finely granulated; opercula and lower parts of head ornamented by thread-like corrugations.

Scales of anterior portion of abdomen granulated, of sides serrated.

Lateral scales $3\frac{1}{2}$ times as high as long.

6. *M. ORNATISSIMUS* Newb. Fish small, fusiform, slender. Length 2 inches; breadth 5 lines.

Cranial surface sparsely tubercled, tubercles somewhat radiated. Spaces between tubercles finely granulated. Opercula, maxillaries and hyoid bones granulated and corrugated. All the scales of the body and tail ornamented with granulations, striæ or denticles.

Lateral scales 4 times as high as long, with a double line of appressed denticles on anterior border, and acute serrations of posterior margin.

Fins all relatively longer than in other species. Dorsal fin nearly opposite anal.

7. *M. INSCULPTUS* Newb. Body fusiform, slender. Length 2 in. 6 lines, breadth 5 lines.

Cranial plates ornamented with elongated tubercles, spaces between tubercles granulated. Sides and under surface of head marked by raised lines and fine granulations.

Scales on anterior half of body highly ornamented. Lateral scales $3\frac{1}{2}$ times as high as long, and having a doubled wave line along anterior margin, with acicular denticulations of posterior border.

Scales of abdomen having entire surface covered with appressed denticles. Scales of tail and posterior portion of body plain.

Dorsal fin opposite anal.

8. *M. SERRATUS* Newb. Small, robust. Length 1 in. 6 lines. Head 4 lines. Tail 5 lines. Breadth of body 5 lines.

Head finely tubercled above. Opercula, maxillaries and hyoid plates marked by fine linear corrugations.

Highest scales of sides 3 times as high as long. All lateral scales quite into the tail, strongly and sharply serrate on posterior margin. Surface of anterior scales wrinkled from the serrations forward.

Anterior margin of anal fin opposite posterior margin of dorsal.

ELONICHTHYS Giebel.

E. PELTIGERUS, Newb. Body short, compressed. Length 5 inches. Height 1 in. 6 lines. Breadth 1 inch. Cephalic bones all ornamented by parallel convolutions of thread lines. Scales all covered by similar raised lines, which cross them diagonally downward and backward, terminating in serrations of the posterior margins.

About the middle of the interval between the occiput and dorsal fin, on the median line, begins a row of oval scales, four times as large as the scales of the sides; ornamented in the same manner, extending in a single row along the median line to the dorsal fin, and behind the dorsal fin to the tail, where they are transformed into the large striated fulcra, which overlie the prolongation of the vertebral to its termination.

These abnormal scales of the dorsal line are a striking peculiarity in the species, and have suggested the name given it.

CELACANTHUS Agass.

1. *C. ROBUSTUS* Newb. Body robust, 1 foot 6 inches in length. Upper surface of cranium covered with small closely approximated tubercles; maxillaries and opercula threaded with fine parallel, sometimes interrupted lines. Margins of opercula in mature specimens wavy.

Scales elliptical, thin, 7 to 9 lines in length, nearly half the surface exposed; exposed portion covered with thread-like lines similar to those of the opercula and maxillaries, and which converge toward the posterior angle of the scale.

C. ORNATUS, Newb. Body fusiform, slender, scarcely wider than head. Size small, not exceeding 4 to 5 inches in length. Upper surface of head ornamented with tubercles, which are much larger and more remote than in preceding species. Opercula and maxillaries threaded, and like the scales having stronger markings than in the larger species.

Radial formula,

A. D. 8; P. D. 5; C. 24?; A. 6; V. ?; P. ?

C. ELEGANS Newb. Body fusiform, robust, 6 to 8 inches in length. Cranial surface covered with closely approximated tubercles. Surface of opercular and maxillary bones threaded. All the ornamenting of head relatively stronger than in *C. robustus*, but less so than in *C. ornatus*. Scales similar in form and markings to those of both these species, but more delicate than either. Anterior dorsal fin slightly in advance of ventrals. Posterior dorsal as much forward of anal fin.

Radial formula. A. D. 7?; P. D. 5; C. 22; A. 6; V. 9?

PYGOPTERUS Agass.

P. SCUTELLATUS Newb. Body fusiform, slender, 15 to 18 inches in length. Head depressed. Snout pointed. Both jaws thickly set with conical, slender, acute, striated teeth of unequal size. Scales very small and thick, higher than long. Head and anterior portion of body covered with articulated plates ornamented with strong, radiating, raised lines. None of my specimens show the form of the caudal fin.

This fish presents such striking differences in its scales and plates from all described species of *Pygopterus*, that I have hesitated about placing it in that genus. It would seem, however, to have much in common with *P. Greenockii* Agass., not yet fully described.

RHIZODUS Owen.

R. LANCIFER Newb. Teeth striated below. Section elliptical, smooth toward the summit, where they are very much compressed, with a lenticular section and cutting edge on both sides. Form of summit of tooth like that of a lance head. Near the apex of the tooth the cutting edge of one side is slightly gibbous, an apparent tendency toward a barbing of the point, as in some species of *Lepidosteus*.

As usually found, the plicated base of the tooth has mostly disappeared, the solid point alone remaining; this is about an inch in length. The entire tooth was more than twice that length.

R. INCURVUS Newb. Head massive. Superficial bones strongly tuberculated. Tubercles elongated, vermicular, sometimes becoming elevated lines of a line in breadth, and having a radiated arrangement. Jaws strong, both thickly set with strong ancipital-curved teeth. These teeth are striated below, elliptical in section, and toward the summit curved backward toward the throat. They are of different sizes, as in all allied fishes. The smaller teeth are 6 to 9 lines in length and thickly set; the larger ones are much fewer in number, and more than twice as long. One of the larger teeth is placed near the extremity of the lower dentary bone of each side, as in *R. gracilis* McCoy.

R. ANGUSTUS Newb. Laniary teeth elongated, slender, finely striated at base, smooth above, with cutting edges. Subordinate teeth half the length of the larger ones. Conical, acute, striated at base, with a circular section throughout. Surface of jaw coarsely tubercled.

In this diversity of form in the teeth, this species differs from *R. gracilis* McCoy and from *R. Hibberti* Ag., as well as from the other species I have found in Ohio. In *R. incurvus* N., however, the teeth have a section so nearly circular that there seems no good reason for separating them by generic distinctions.

Of all the species of *Rhizodus*, which I have found, I probably have scales and perhaps vertebrae and cranial plates, but as yet have been unable to find these organs connected with the teeth.

DIPLODUS Agass.

D. COMPRESSUS Newb. Teeth of moderate size, base small. Lateral denticles unequally spreading, compressed, with acute points and strongly crenulated edges. Central denticle very small, acute, compressed, finely crenulated on margin.

D. GRACILIS Newb. Tooth as large as *D. gibbosus* Agass. Base very small. Lateral denticles long, curved, slender, divergent towards the points, much less compressed than in preceding species, less acute, and less conspicuously crenulate on margins. Median denticle small, subulate, scarcely crenulate on margins.

D. LATUS Newb. Teeth very large and very robust. Lateral denticles nearly straight, and on the same plane, divergent, $\frac{1}{3}$ to $\frac{1}{2}$ as broad at base as long, compressed. Each margin strongly crenulated. Middle cone obsolete, or reduced to a simple knob. Base of tooth large, under surface flat.

All the specimens of *Diplodus* from Ohio which have come under my observation, numbering some hundreds, have crenulated margins, in that respect presenting a striking difference from the species described by Agassiz.

CLADODUS Agass.

C. ACUMINATUS Newb. Central denticle elongated, conical, acute; lateral denticles very acute, compressed. Base small and thin.

CHIRODUS McCoy.

C. ACUTUS Newb. Teeth as long as *C. pes-rana* McCoy, but more slender throughout. Denticles more acute.

CLIMAXODUS McCoy.

C. BREVIS Newb. Teeth oval, in form, shorter than *C. imbricatus* McCoy. Ridges which cross the surface more remote, with sharp crests and sinuous outline.

PLEURACANTHUS Agass.

P. BISERIALIS Newb. Spine straight, strong, tapering rapidly to a moderately acute termination. Length four inches; diameter at base 4 lines. Anterior face rounded; posterior face nearly flat. Entire surface finely striated longitudinally. Sides flattened, joining posterior surface at right angles. At angle on each side a double row of small, closely set, acuminate, depressed hooks. On the upper part of the spine the hooks are arranged in a single row. Side of spine at base of the hooks marked by a distinct longitudinal furrow.

P. ARCUATUS Newb. Spine slightly curved backward, rapidly tapering to an acute point. Anterior surface rounded; posterior face nearly flat. At angle formed by the junction of sides with posterior face is, on each side, a single row of closely set, acuminate, depressed hooks. Anterior surface marked with fine longitudinal striæ.

P. DILATATUS Newb. Spine short, robust, one inch six lines long, straight, acuminate at summit, largest near middle, contracted at base. Anterior face rounded; posterior face flattened, and bearing at the angles on either side a row of minute depressed hooks. Surface smooth.

COMPSACANTHUS Newb.

Spines of small size, very neat in form and finish. Section at all points circular. A single row of relatively large, remote, depressed hooks is set along the posterior median line.

Of this genus I have probably but one species.

C. LEVIS Newb. Spine slender, curved, acuminate, having a circular section at all points; upper two-thirds furnished with a single row of depressed acuminate hooks remotely set along median line of posterior surface.

